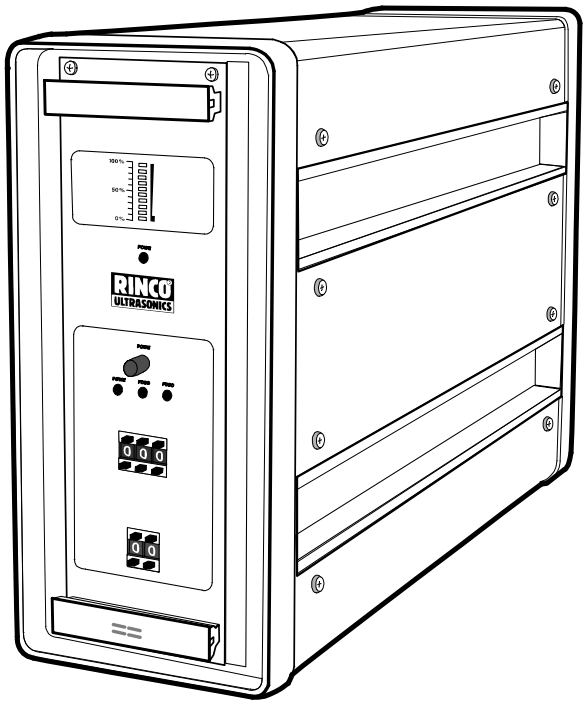
Ultrasonic welding device for plastics

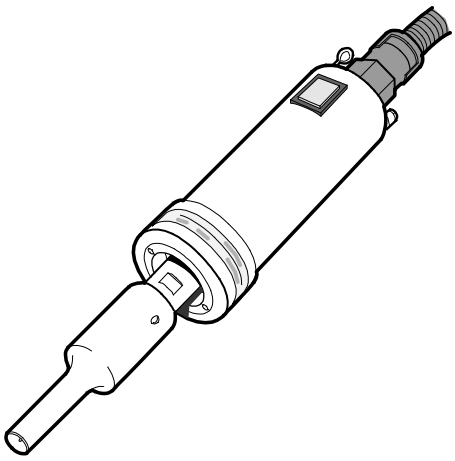
Hand welding device HW35-3

with

Generator RL35



RL35



HW35-3

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A CREST GROUP COMPANY

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Note

Read this operating manual and study it carefully before unpacking and putting the device into operation.

The device may only be used, maintained and repaired by persons who are familiar with the operating manual and the applicable regulations concerning working safety and accident prevention.

Device specification

Sticker

Device

Sticker

Generator

Representative

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Preface

Congratulations on having purchased the device.

This manual is designed to provide buyers and users with all the information they will need to handle, install, operate and maintain the device.

To ensure that the system is always ready for operation, it is necessary to follow the notes and instructions in this manual.

The manual is broken down into the following chapters:

Chapter	**Safety information** Contains notes and warnings concerning the operation of the welding system.
Chapter	**Product information** Contains all the general information concerning: - function, design and mode of operation - technical data - warranty
Chapter	**Transportation** Contains necessary information on the transportation and receipt of the device.
Chapter	**Operating and display elements** Describes the operating elements.
Chapter	**Initial start-up** Provides important notes and instructions concerning the installation, connection and start-up of the device. Includes all the information and procedures necessary for the safe and efficient handling of the device.
Chapter	**Elements** Describes the various exchangeable elements.
Chapter	**Retooling** Describes how to change a horn or booster.
Chapter	**Cleaning and maintenance** Contains instructions and notes concerning the care and upkeep of the device.
Chapter	**Error messages and corrective action** Describes possible errors, their likely sources and suggestions for corrective action.
Other chapters	**Diagrams and drawings**

Important!

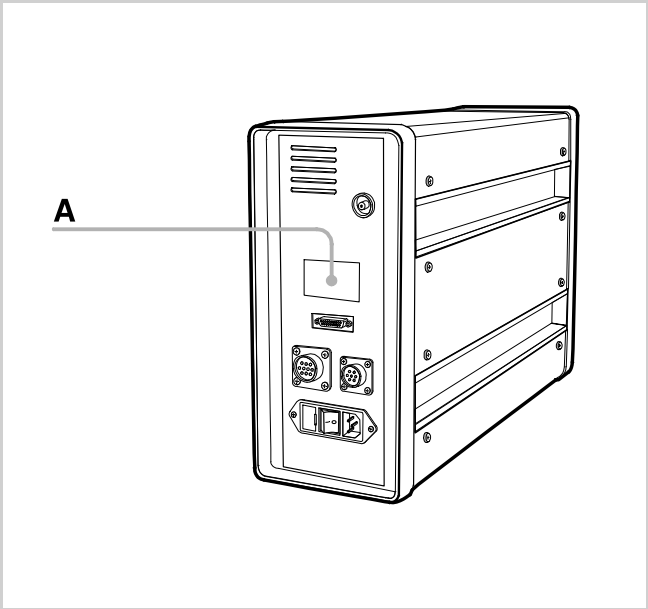
Please quote the exact type designation and the device serial numbers in all enquiries concering your device.

You will find this data on the rating plate (A) at the back of the device, as well as on the inside cover flap of this operating manual.

The design and circuitry of this device are subject to continuous further development and improvement, and represent the latest state of the art.

RINCO ULTRASONICS AG

Romanshorn, Switzerland

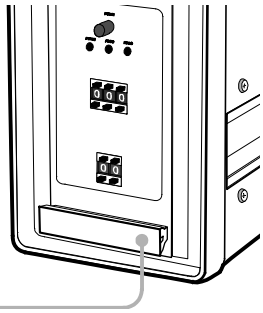


1 Explanation of symbols and signs

Special attention should be paid to passages with the following symbols:

Special information or operating instructions.

Warnings regarding risk of personal injury or damage to parts of the equipment.



The item numbers used in the illustrations and descriptions, e.g.:

Generator module grips (26)

correspond to the item numbering adopted in the product overview included in the chapter "Product information", or to adjacent drawings, generally on the same page.

2 Safety information

2.1 General

The design of this device conforms to the current state of engineering and is safe to operate.

The individual modules and the completedevice are subject to continual inspection by our quality assurance department.

2.2 Intended purpose

This device is intended exclusively for the ultrasonic welding of suitable plastics. Any other use is regarded as inconsistent with the intended purpose, and is undertaken at the user's own risk. The manufacturer is not liable for any resultant damage.

Intended for industrial use.

2.3 Special points to note

Before you start up the device for the first time, read this operation manual carefully.

Being badly informed about how to operate and look after the device can result in damage.

Always keep the operating manual handy at the site of the device.

Do not perform any modifications, extensions or conversions on the device which might endanger safety without the supplier's consent.

Do not alter the programming (software) of programmable control systems.

2.4 Choosing staff

Work on the electrical installations of the device may only be performed by an electrical specialist or instructed staff under the management and supervision of an electrical specialist, according to electrical engineering standards.

2.5 Installing the device

Always unplug the power cable before making any connections to peripheral devices.

Be sure to fit the power supply with a grounding connector!

Observe any statutory safety regulations in force in your country!

Failure to observe these regulations will exempt the manufacturer from all liability for injury to persons or damage to materials!

Before starting up the device, always make sure it is in a closed and safe condition.

2.6 Operation

Never open the generator or converter housing while the device is in operation.

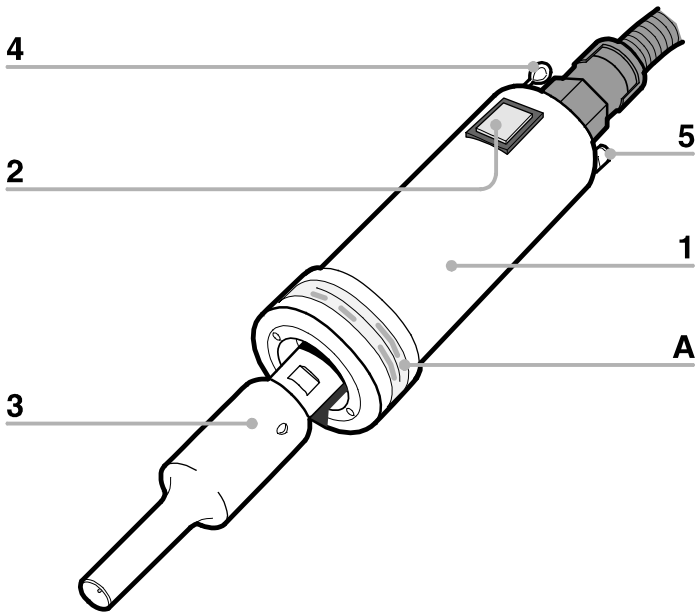
There is a high voltage inside the device - risk of injury!

Avoid any potentially unsafe working practices.

Correct operation and careful handling of the devices and their associated tools during operation will

- keep the system ready for service,
- prolong its useful life, and
- reduce stoppage times to a minimum.

1



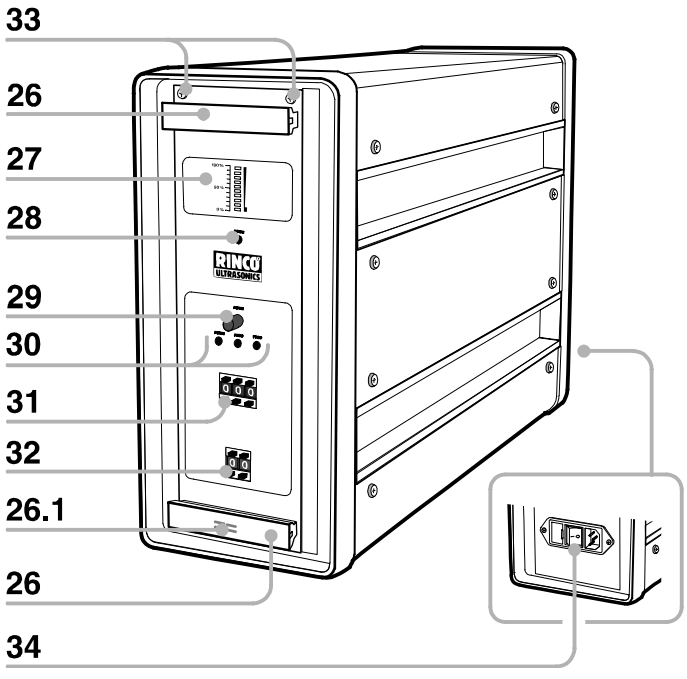
3 Product information

3.1 Product overview

3.1.1 Hand held cutting device

1 Housing
2 Trigger switch
3 Horn
4 Suspension
5 Cooling-air connections
A Name plate on housing

2



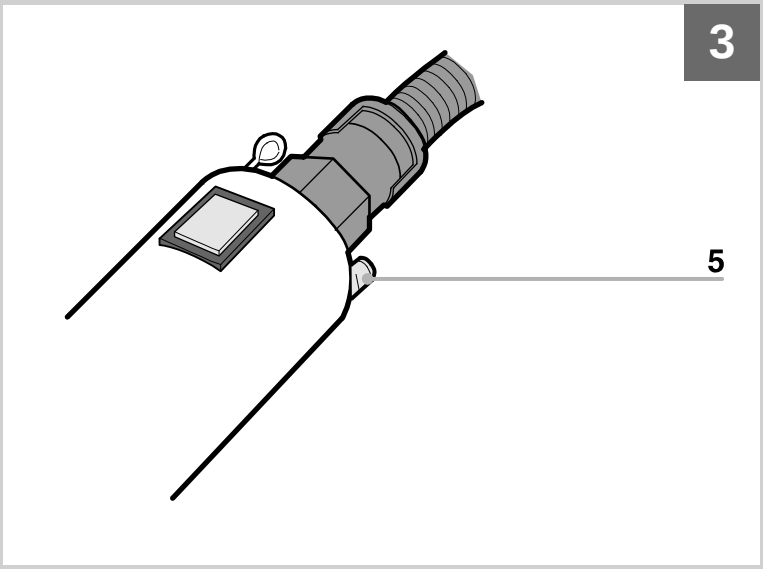
3.1.2 Ultrasonic generator RL35

26 Generator module handle
26.1 Model designation
27 LED bar
28 LED, power
29 Function key "US-TEST"
30 Status displays
US ON (green)
VALVE (green)
ERROR (red)
31 Weld time
32 Hold time
33 Fastening screws
34 Mains switch

3.1.3 Cooling (optional)

It is necessary to cool the converter for heavy duty use.

5 Connection for hose ÿ 4



3.2 Warranty statement

With the delivery of this system RINCO ULTRASONICS AG acknowledges its warranty obligation in accordance with VSM (Association of Swiss Machine Builders).

Fulfilment of the terms of this warranty by RINCO ULTRASONICS AG shall be conditional, however, on a number of requirements, for example:

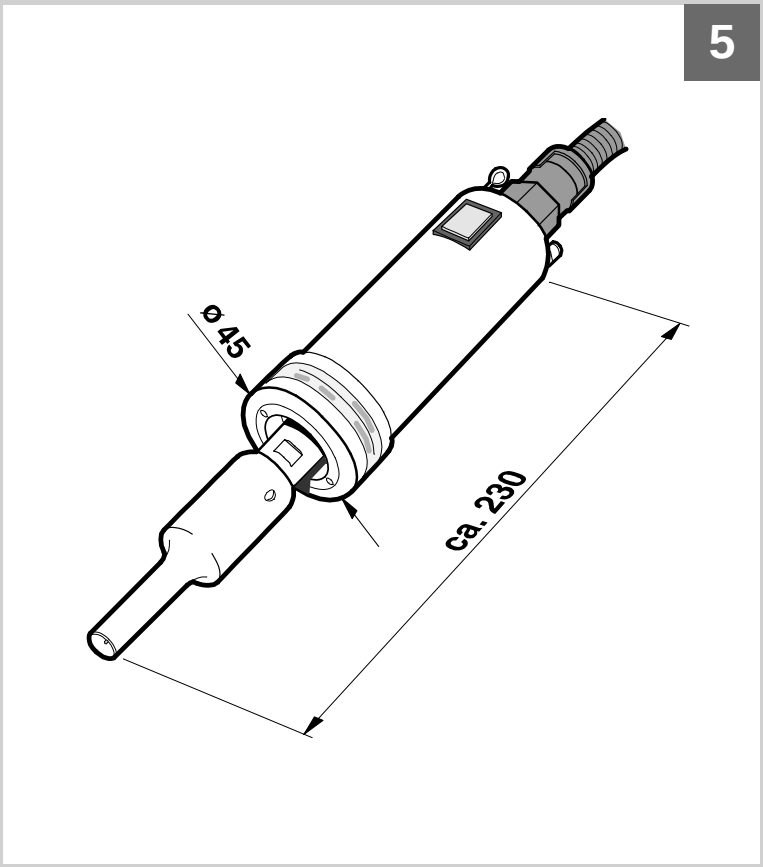
The user must be familiar with the contents of this Operating Manual.

The instructions and warnings contained in this Operating Manual must be observed.

Unauthorized conversions or modifications to parts of the device and generator are prohibited.

RINCO ULTRASONICS AG shall be glad to clarify any unlcear points on the phone or to provide instruction by capable specialists.

3.3 Technical data device HW35-3



Dimensions in mm

3.3.1 Concept

- Robust handy housing
- Ergonomic trigger switch
- Piezoelectric converter
- Connecting screw thread for horn: M8

3.3.2 Compressed air

- Dry compressed air, maximum: ..... 7 bar (105 PSI)

3.3.3 Dimensions

- Dimensions: ..... see fig. page 3-4

3.3.4 Weight

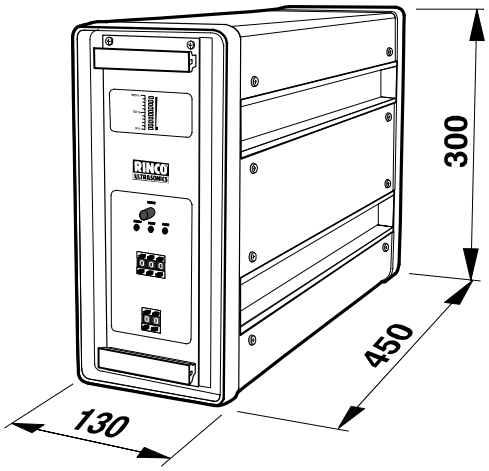
- Weight ..... ca. 0.7 kg

3.3.5 Connecting cables

- Standard length: 3m
- Other lengths: ..... to order

3.4 Technical data of the Ultrasonic Generator RL35

6



Dimensions in mm

Weight: ..... 7 kg

3.4.1 Concept

- Flexible modular system with various insertable modules.
- Well arranged and simple input of parameters.
- Optimum efficiency and low power loss.
- Detection of system malfunctions.
- Interface for PLC.

3.4.2 Available generator modules

Type	max. power
UGF 35-250	250 W
UGF 35-400	400 W
UGF 35-600	600 W
UGF 35-900	900 W

3.4.3 Connected loads

- 230 V 50-60 Hz
- Optional 200 V
  110 V (to 600 W)
- Maximum current consumption ..... 4 A

3.4.4 Dimensions

- Dimensions: ..... see fig. page 3-6

3.4.5 Weight

- Weight: ..... 7 kg

4 Transportation

Transportation instructions on the packaging must be observed.

4.1 Unpacking/receiving inspection

The shipping container used for our devices withstands the normal wear and tear of road, rail and air transportation.

After receiving the consignment, check whether all the parts conform to the packing list and look for any visible signs of damage. If you discover any damage, notify the carrier immediately and keep the packaging as evidence.

4.2 Damage during transit

The carrier is responsible for any damage incurred during transit. A complete report containing an exact description of the damage must be submitted to the carrier as the basis for the damages claim.

Incidents of damage or loss involving goods delivered by us must be reported to us immediately and they must be confirmed with a copy of the above mentioned report.

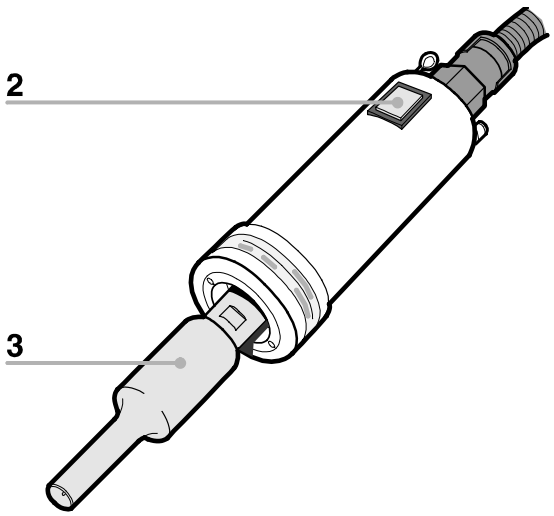
If the delivery is arranged carriage paid or CIF by RINCO ULTRASONICS AG, the damaged consignment will be replaced if necessary and claims will be levelled against the relevant transit insurance.

4.3 Positioning the device

The location of the device is important. In order to guarantee a long service life, the device should be installed in clean surroundings. Make sure that the electronic equipment is mounted in a vibration-free environment.

The factory settings are performed at 20°C. The ambient temperature can range between 10° and 45° during operation.

1



5 Controls and indicators

5.1 Hand held welding device

2 Trigger switch

This activates the ultrasonic vibrations.

Do not touch horn !

3 Horn

Never alter a tuned horn mechanically. This can result in damage to the vibration system und generator.

The horn is the actual sonic tool. It is tuned to the resonance frequency by the manufacturers.

5.2 Ultrasonic Generator RL35

26 Generator module handle

If necessary, you can pull out the generator module by holding these grips. The fastening screws (33) for opening the generator module are located above and below the grip bars.

The generator module is never to be pulled out or plugged in while mains is connected. (high voltage)

27 LED bar

This display indicates the power supplied during the welding operation. When the horn is idle (vibrating freely in the air), the display should not rise above the 25% mark.

An error message will be issued if the 100% mark is exceeded.

28 LED "POWER"

"POWER" indicator.

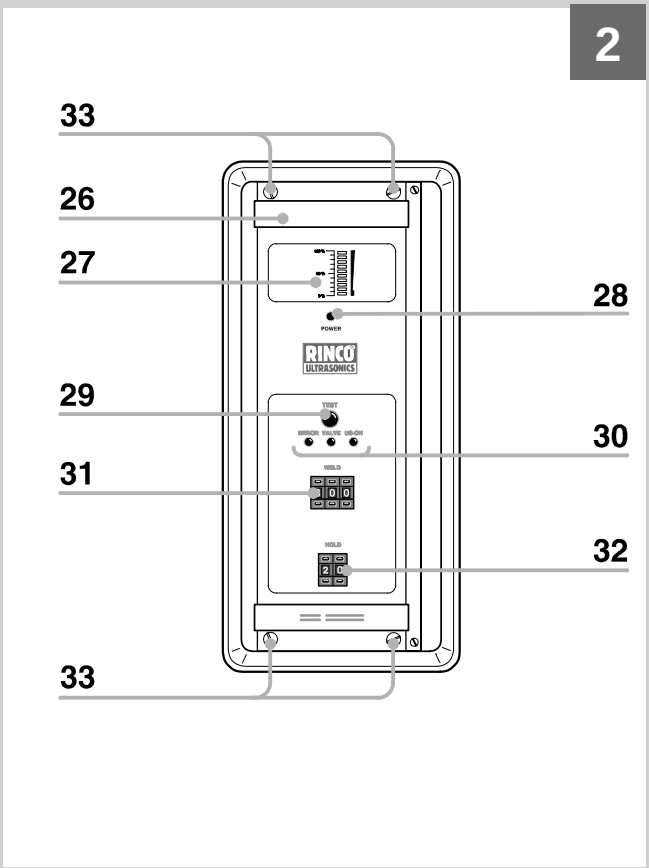
29 Key "US-TEST"

Key to activate ultrasonics test.

Do not touch horn!

30 LED

- "US-ON" Ultrasonics active
- "VALVE" Solenoid valve active
- "ERROR" Error output active



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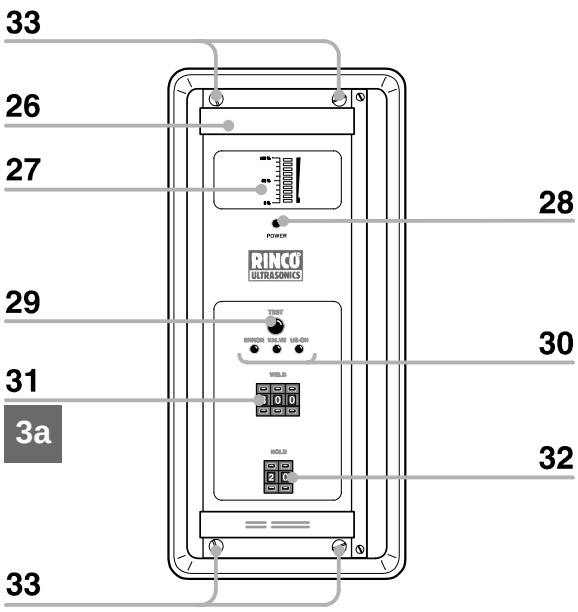
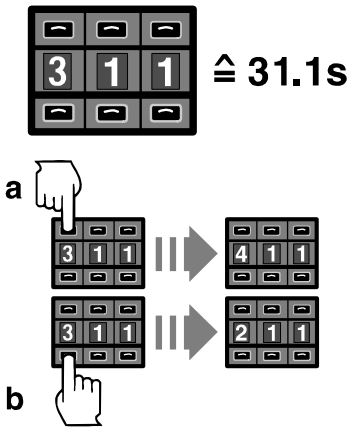


3a



31 Weld time

3a

Using this keypad you can

- change the weld time.
  a) increase numeral
  b) decrease numeral

With the initialisation on the internal program selection switch (level 9) following section 8 „Resetting“, the welding time is increased by a factor of ten (99.9 sec.)

32 Hold time

This setting does not apply to hand held device.

33 Fastening screws

Must be locked in operation !

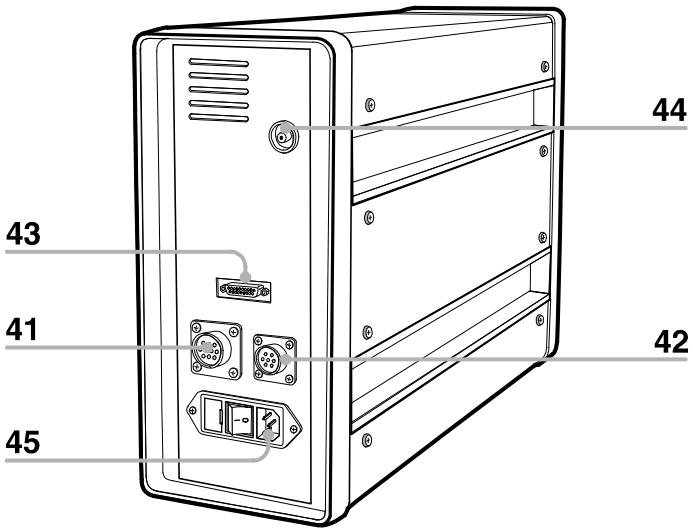
6 Initial start-up

6.1 Choice of location

Select the location for the device according to the following criteria:

- clean surroundings
- a base for the electronic devices which is free from vibration
- an ambient temperature
  during operation: . 10 °C - 45 °C
  when setting: ..... 20 °C

1



6.2 Assembling and connecting up the devices

To prepare the devices for operation, carry out the following steps:

1. Connect up the cables between the press and generator.

Be sure to fit the power connection with a grounded connector.

2. Plug the device plugs in the sockets of the Generator:

41 STO1 Optional

42 STO2 Start

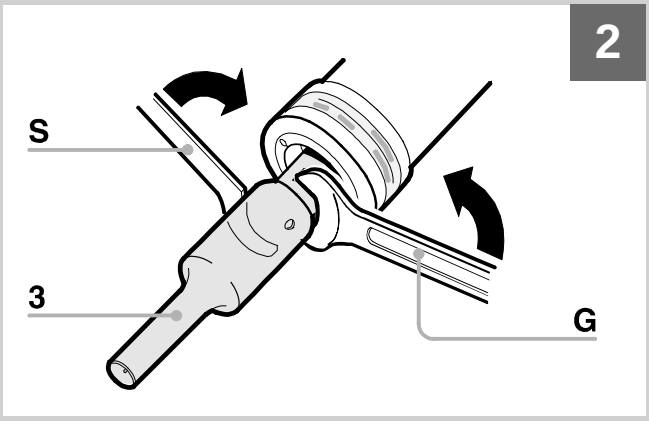
43 STO3 Interface (optional)

44 STO4 Converter connection

45 STO5 Mains connection

2

3. Tighten the horn (9) with two spanners of correct size (G/S)

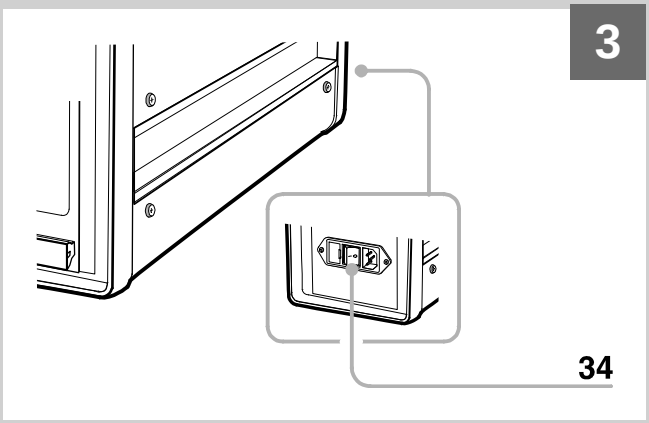


3

Do not touch horn !

4. The device is switched on at the main switch (34).

The device is ready for operation after a built-in check.



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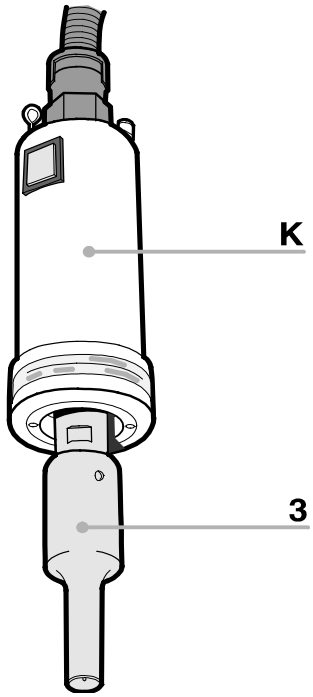


7 Elements

7.1 Converter

The converter is a sensitive instrument.
Please handle with great care!

The converter (K) is the core of every ultrasonic welder.

It belongs to the category of piezo-electric converters.

Piezoelectric converters consist of several ceramic disks that change their size when an electric voltage is applied.

In the case of the ultrasonic welding converter, an alternating voltage with the nominal frequency (e.g. 35 kHz) is applied. This electric signal is converted by the piezoelectric elements into a mechanical vibration of identical frequency.

A mechanical vibration in the axial direction is thus available at the front end of the converter (K).

The efficiency of a piezoelectric converter is extremely high. The small losses which occur during the conversion are noticeable in a rise in temperature of the converter.

Residual heat is dissipated by natural convection thanks to the special design of the converter.

Special applications require dissipation of heat by additional ventilation (optional).

The converter must not be warmed up to more than 50°C at the contact point. Converter, horn and generator may be damaged by overheating.

The converter must be fastened with a tightening torque of 15-25 Nm.

7.3 Horn

Any changes to the metallic body of the horn will affect its vibration characteristics and should not be performed without consulting the manufacturer!

The horn (3) is the tool that transfers the ultrasonic energy produced by the converter to the welding object in the form of an intensive vibration.

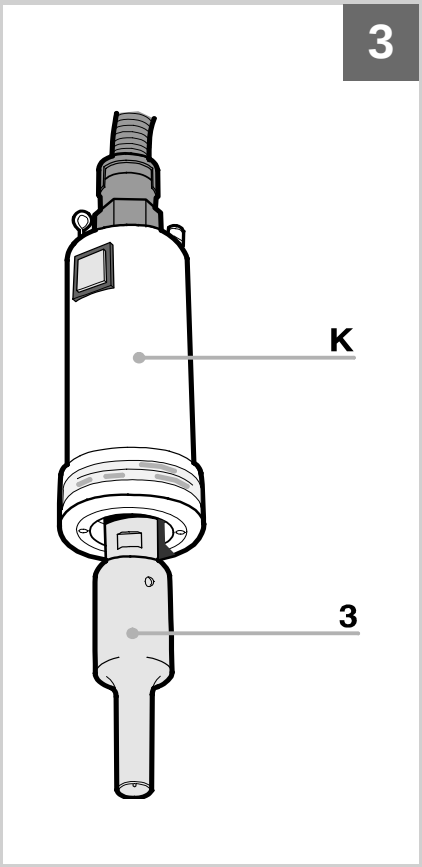
Since workpieces come in a variety of forms, horns have to be adapted to the specific requirements.

The horn is an acoustic body tuned to the resonance frequency. This accounts for restricted shaping possibilities.

The geometrical form of the horn should be kept as simple as possible.

Other important factors in addition to the geometrical shape of a horn are:

1. The horn must be tuned to the resonance frequency of 35'000 Hz (±50 Hz) at 20°C. During operation a tolerance of +150 Hz / -250 Hz is permitted.
2. For the horn to vibrate correctly it must be designed as far as possible to move in an axial direction at its transmission surface.
   The aim is to produce pulses on the horn face that act as far as possible in an axial direction and which can be transmitted to the welding object.
3. The amplitude of the horn is determined by means of its design. For the production of horns it is vital to have a knowledge of the load capacity of various materials.



7.3.1 Horn materials

Horns are manufactured exclusively from specifically high-strength materials; namely high-strength aluminium, titanium and steel alloys.

The choice of material depends largely on the intended application.

Various factors are crucial for choosing the material:

1. The strength of the horn material in conjunction with the amplitude to be attained.
2. The surface condition of the material and its related surface finishing characteristics.
3. The ultrasonic transmission characteristics.
4. The heat conducting characteristics of the horn material.

Allowance must also be made for the fact that horns are subject

to immense mechanical loads.

It is extremely important, therefore, to design the horn in such a way as to enable the plastic part to be joined under optimal conditions.

The horn surface may have a coating for abrasive plastics for longer service life.

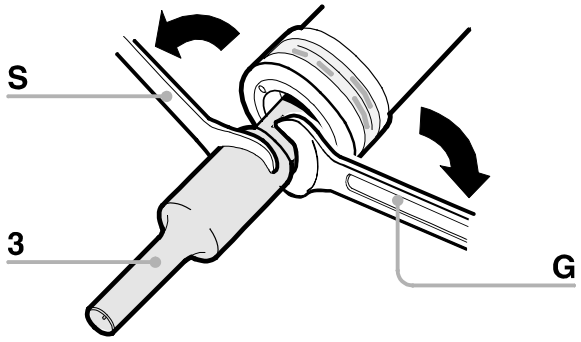
RINCO has a long record and a lot of experience in horn manufacture.

Horns that are manufactured without the necessary theoretical and practical experience are bound to lead to unsatisfactory and poor welding results and hence to inferior product quality.

In some cases the vibration system and generator may be damaged.

The horn must be fastened with a tightening torque of 15 - 25 Nm.

1



8 Retooling

8.1 Changing horn

It is important to ensure that the mains switch on the generator has been switched off before unplugging the HF cable!

1. Separate the horn (3) with spanners (G/S).

1

Never put the two parts in a vice or similar tool!

2. Screw on the new welding tool and tighten.

8.2 Detailed description of functions from the program selector switch

Ultrasonic devices are used in a wide range of fields today, so that users have a variety of different control requirements. A welding installation needs to be able to be connected to the available peripheral devices.

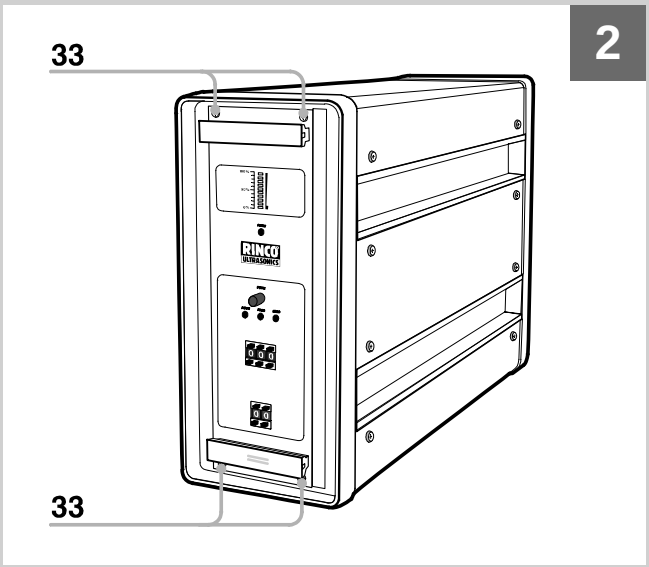
For this reason, a number of programmes have been created to suit the most common peripheral requirements. These programmes are permanently installed in an integrated computer and can be preselected via rotary switches.

The program selector switch is deliberately located on the card module (see fig. 4a) inside the housing in order to prevent unauthorised changes to the program.

8.2.1 Before changing a program

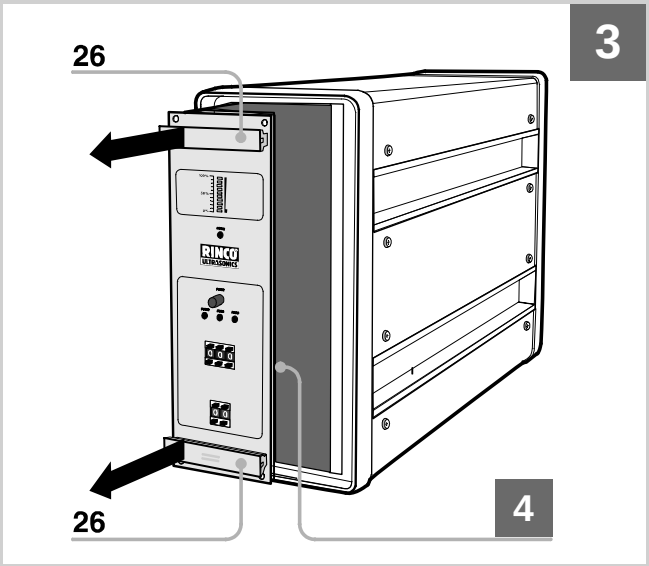
2

1. Disconnect the device from the power supply.
2. Unscrew the 4 fastening screws (33).



3

3. Take out the generator module by pulling the grips (26).



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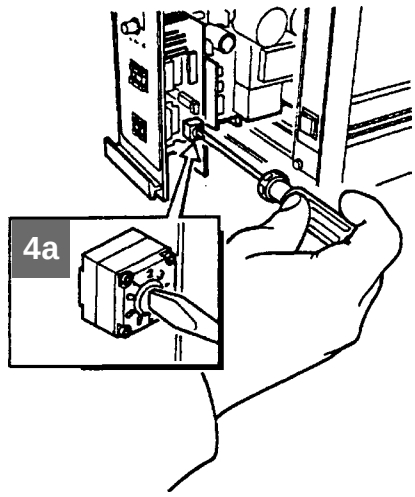


The program selection switch has 10 settings.

For US-operations <u>without</u> pneumatic tool advance. 4a

The standard setting for hand held devices is '0'.

Mode	Adjustment
0	external welding time
1	internal welding time
9	Pulse with settable welding time; max. 99.9s

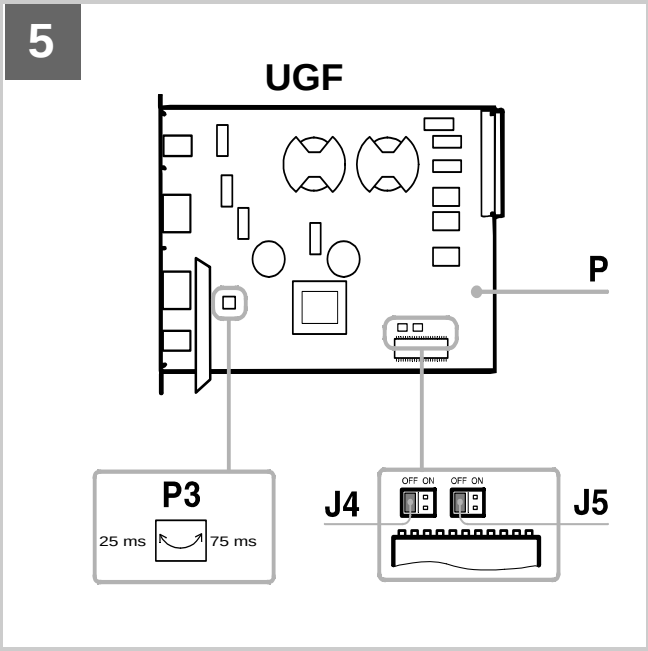
With setting level ”9”:

Toggle switch:

Ultra sound operates automatically according to the pre-set time without holding "start 1".

Re-activating "start 1":
The ultra sound is stopped.

If the time has been set at ”00.0” the ultra sound is maintained with "start 1".



8.2.2 Afterpulse (shake-off impulse)

The afterpulse can be activated with a jumper on the main circuit board. The afterimpulse occurs 0.3 seconds after the holding time has expired.

J4 ”Hardware test program” jumper (only for use by the manufacturer)

J5 ”US afterpulse” jumper

P Main circuit board

The standard setting of J4 and J5 is "OFF".

The time of the afterpulse can not be changed.

8.2.3 Soft Start

The greatest strain on the transducer system occurs when the oscillations are first stimulated. To avoid overloading and resultant damage, a soft-start device has been installed in the RINCO generator, which can be continuously adjusted from 25ms to 75ms. Your device is supplied with a setting of 50ms.

The adjustment potentiometer (P3) for the soft-start device is located on the card module inside the housing in order to prevent accidental alterations of the setting. (Only UGF)

Important: Before switching on the card module again, always make sure that it is fully and correctly reinserted (front panel flush).

9 Cleaning and maintenance

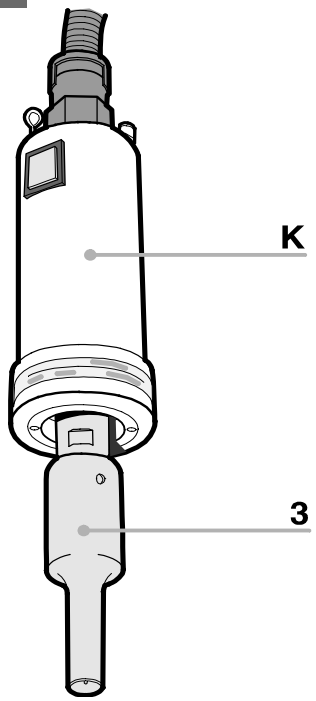
9.1 General maintenance jobs

Cleaning and maintenance jobs may only be carried out by specially trained staff.

Before beginning maintenance jobs, make sure that all energy sources such as the power and compressed air supply are disconnected.

Attention: Never clean the keypad or plastic sheeting of the generator with caustic agents.

1



9.2 Hand held welding device

The hand held welding device requires no special maintenance. However, regularly cleaning the

- converter (K),
- horn (3),

is essential for a long and trouble-free operation of the device system.

1

9.3 Generator

The generator requires no maintenance.

9.4 Vibration system

Work may only be carried out on the vibration system and converter housing when the mains voltage is switched off! High voltage!

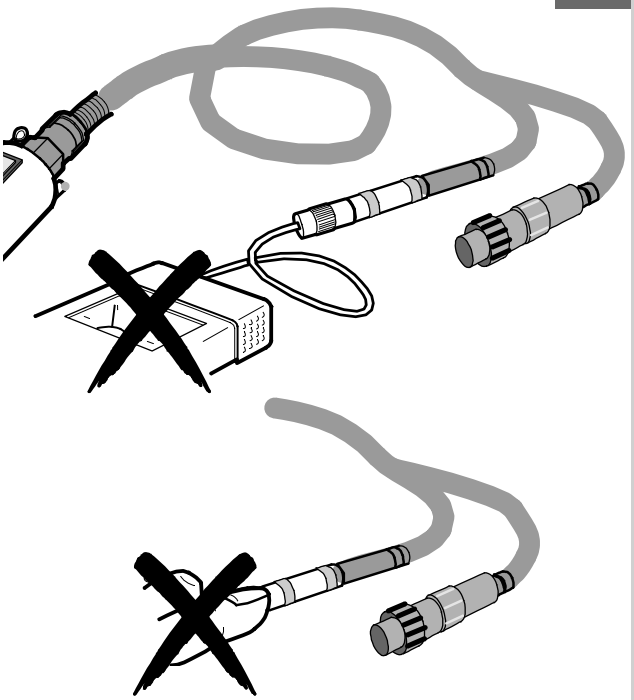
2

Avoid contact with the RF socket of the converter.

Never connect any measuring instruments to the RF socket of the converter!

The converter is electrically charged even after switching off the generator.

2



9.5 Threaded coupling

3

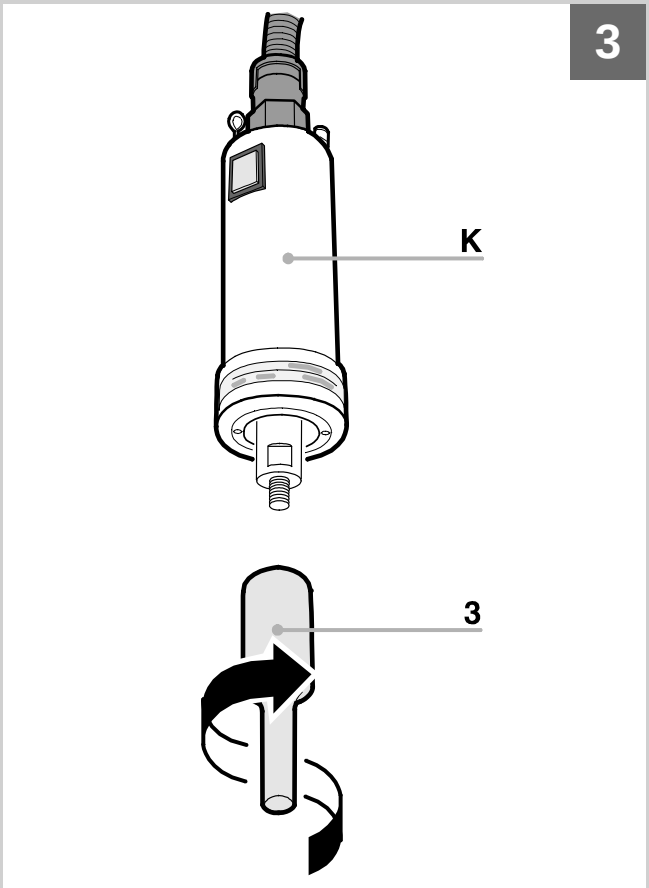
The converter (K) and horn (3) are joined together by threading couplings.

Tightening torque: 15 - 25 Nm

Black marks on the surface of the horn (3) are easy to remove.

1. Lay out a polishing cloth on a level surface.
2. Draw the blackened area over the polishing cloth.

3



10 Error messages and trouble shooting

Troubleshooting may only be carried out by specially trained staff. In case of doubt, contact the service centre or the manufacturer directly (see appendix).

10.1 Error messages / corrective action: switching on

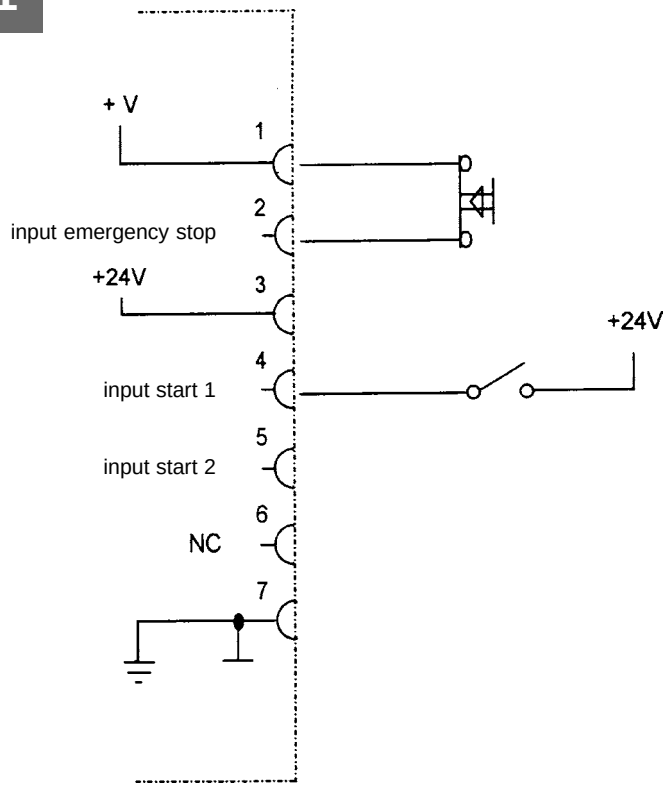
Error	Possible cause	Corrective action
Generator cannot be switched on	- no voltage supply - EMERGENCY STOP button pressed - fuse faulty - module not in its housing	- insert mains plug - release EMERGENCY STOP button - test fuses F1-F5 - insert module and bolt together

10.2 Generator error messages during operation

Error	Possible cause
red LED lights-up due to "OVERLOAD"	- maximum welding pressure too high - generator output too low for intended application - vibration system faulty
Constantly illuminated red LED	- No trigger signal within 10 seconds - No US stop signal - Start 1 not held before the safety switch was reached or the holding time has expired - No Start 2

If three faults occur in a row the generator is blocked and must be acknowledged with key "US TEST" .

1



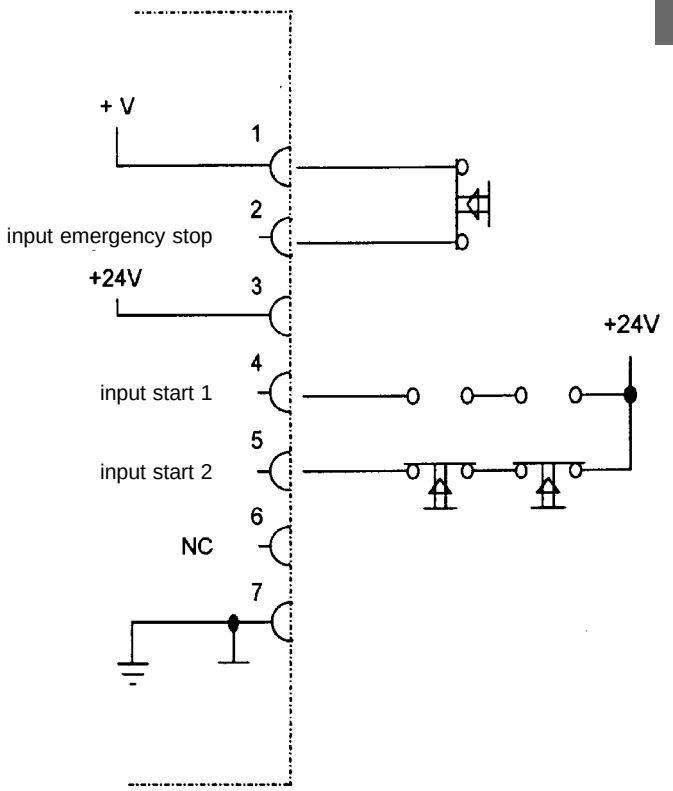
11 Electrical diagrams

11.1 Wiring diagram for housing

11.1.1 Start ST02 automatic (standard)

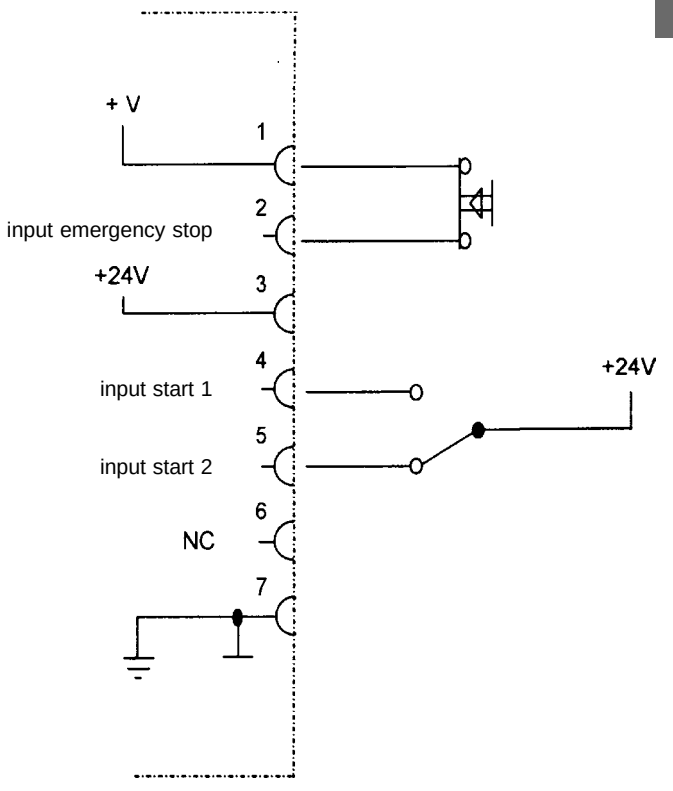
11.1.2 Start ST02 manual (optional)

2

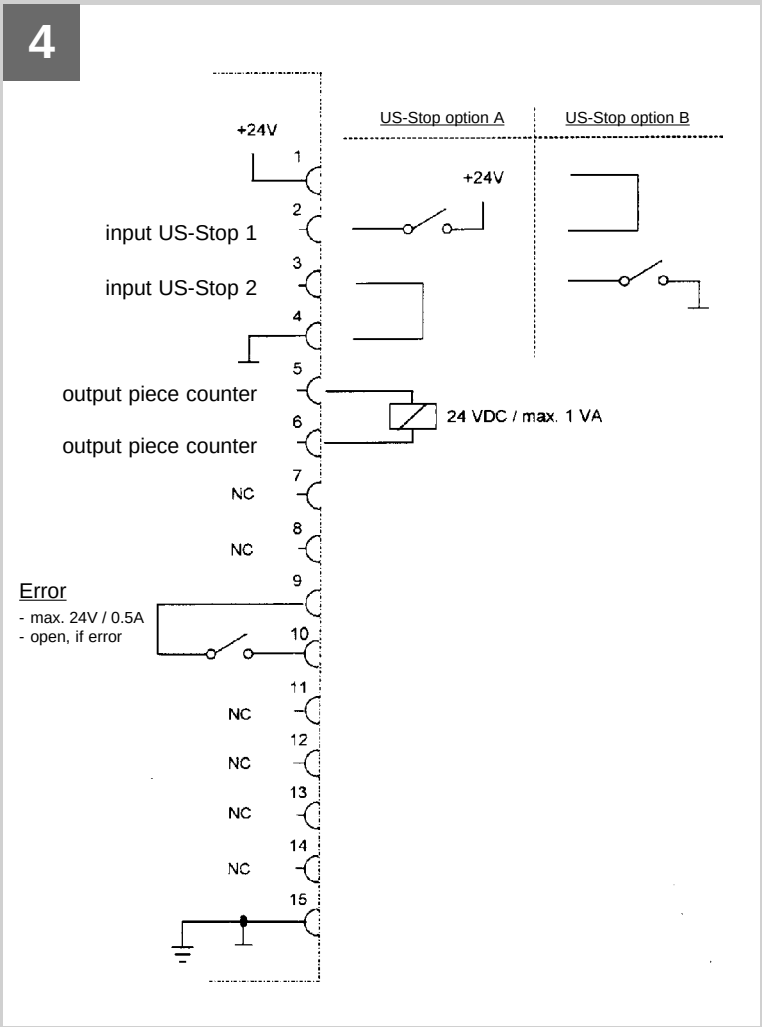


11.1.3 Start ST02 manual (optional)

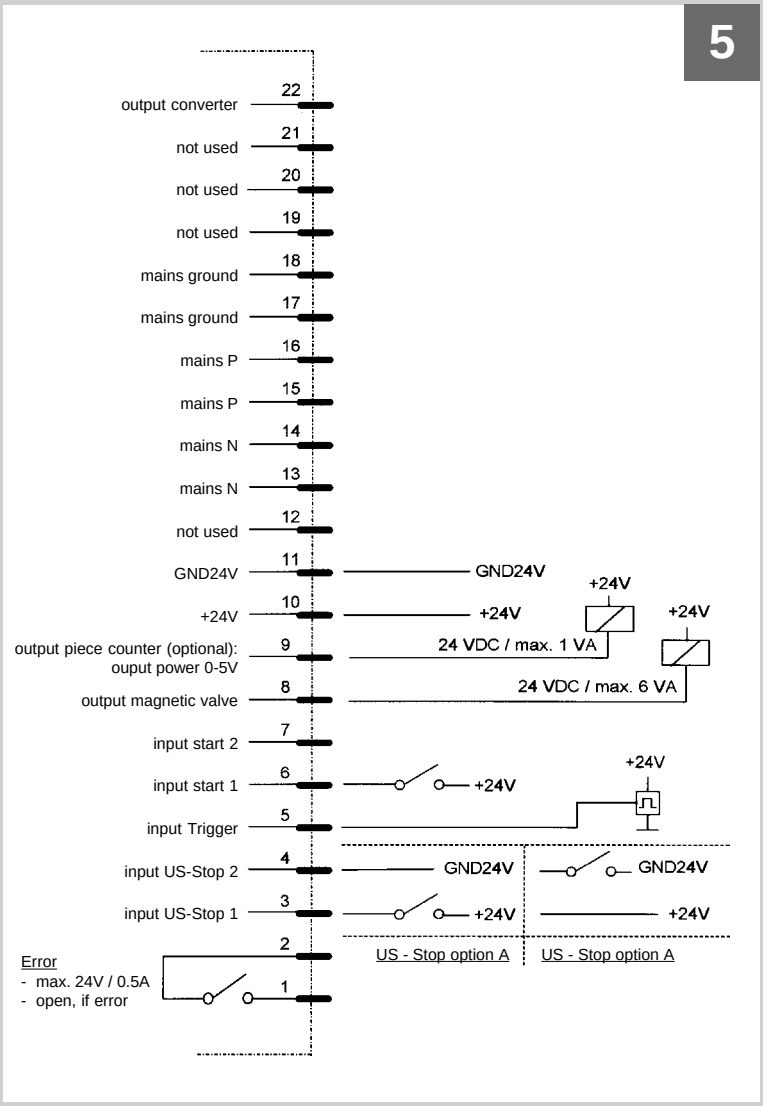
3



11.1.4 Interface ST03



11.1.5 Generator module UGF

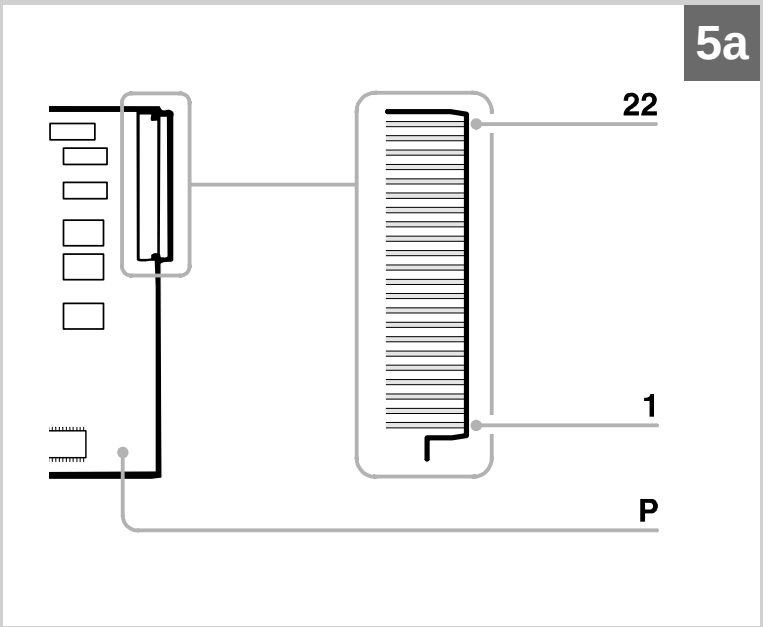


Detail of printed circuit board

1 *Connection '1'*

22 *Connection '22'*

P *Main board*

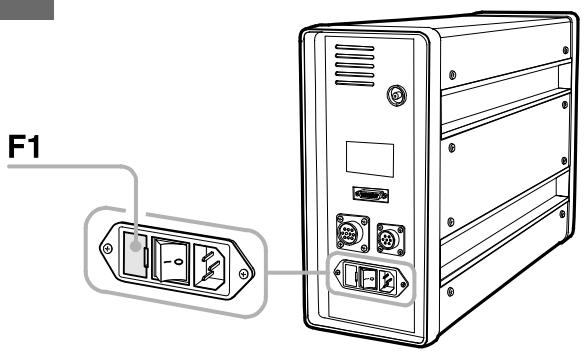


11.2 Fuses Generator RL35

Fuses are to be found in the following assemblies:

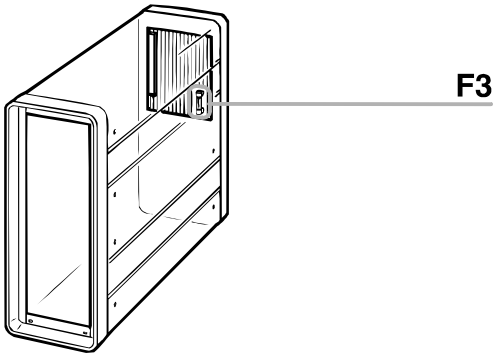
Power socket

6



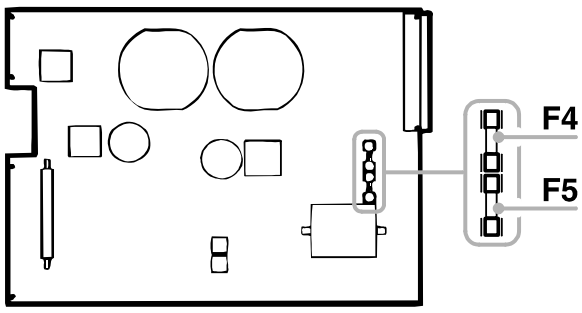
Bus print

7

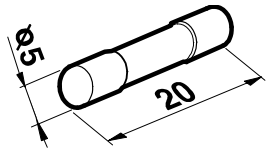


Generator module

8



9



All fuse dimensions: 5 x 20 mm.

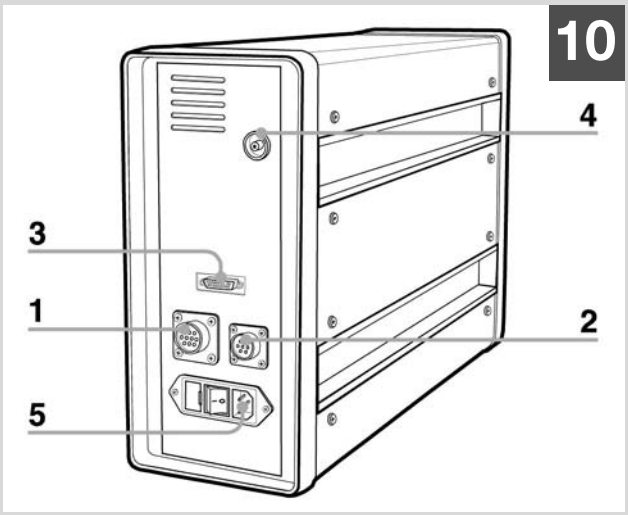
11.3 List of fuses Generator RL35

11.3.1 Fuses 230 volt / 200 volt

Generator	Power socket		Bus print	Generator module	
	F1	F2	F3	F4	F5
UGF35-250	3.15 A/T		400 mA/T	3.15 A/T	100 mA/T
UGF35-400	4 A/T		400 mA/T	4 A/T	100 mA/T
UGF35-600	4 A/T		400 mA/T	4 A/T	100 mA/T
UGF35-900	6.3 A/T		400 mA/T	6.3 A/T	100 mA/T

11.3.2 Fuses 110 volt

Generator	Power socket		Bus print	Generator module	
	F1	F2	F3	F4	F5
UGF35-250-110	6.3 A/T		400 mA/T	6.3 A/T	160 mA/T
UGF35-400-110	8 A/T		400 mA/T	8 A/T	160 mA/T
UGF35-600-110	8 A/T		400 mA/T	8 A/T	160 mA/T



11.4 RL 35 Generator rear panel

1 STO1

2 STO2

3 STO3

4 STO4

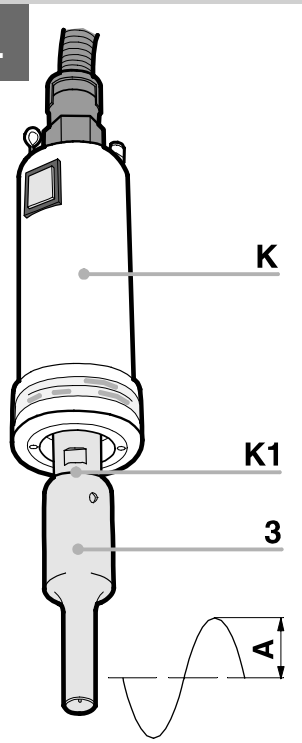
5 STO5

11.5 List of device sockets and connection plugs

List of device socket			RINCO order-No.
STO1	Appliance socket	14 pol. AMP	5445
STO2	Appliance socket	7 pol. AMP	5442
STO3	Appliance socket	SUB-D 15 pol.	5469
STO4	Appliance socket	Lemo 1	7254
STO5	Appliance socket	250V/8A	5053

Liste der Anschluss-Stecker			RINCO order-No.
ST1	Plug	14 pol. AMP	5443
ST2	Plug	7 pol. AMP	5440
ST3	Plug	SUB-D 15 pol.	5446
ST4	Plug	Lemo 1	2646
ST5	Power cable	250V	depending on country

1



12 Technical drawings and values

12.1 Amplitude values of the generator RL

The different generator outputs result in different amplitudes.The amplitude value described in the following table refers to the respective generator/horn configuration.

The effective welding amplitude can thus be read off directly.

3 Horn

A Amplitude

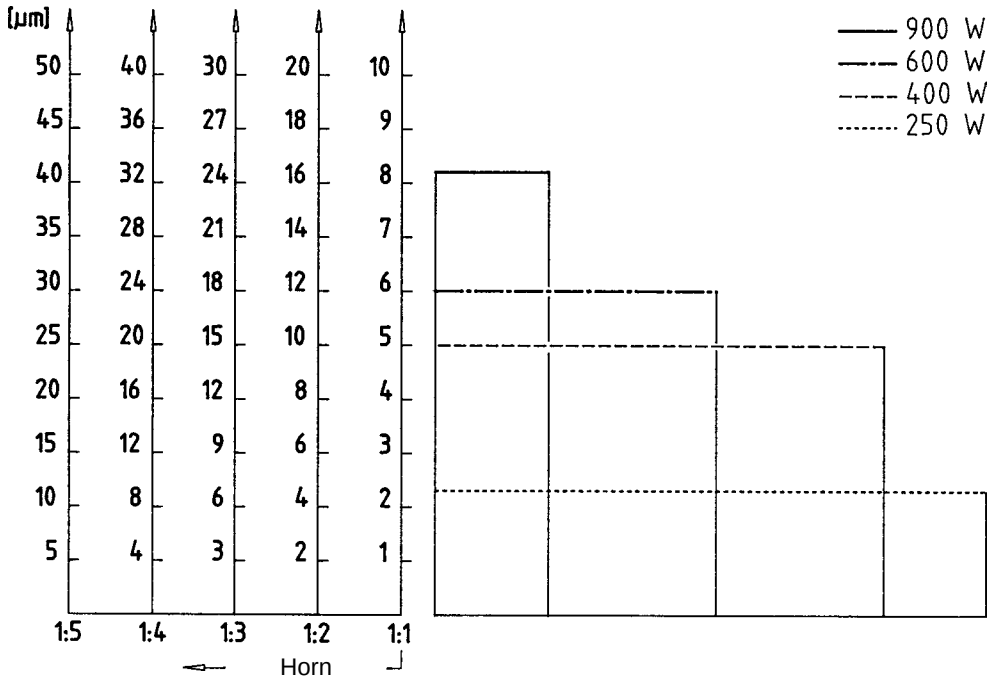
K Converter

K1 Coupling point

12.2 Amplitudes of 35 kHz RL generators

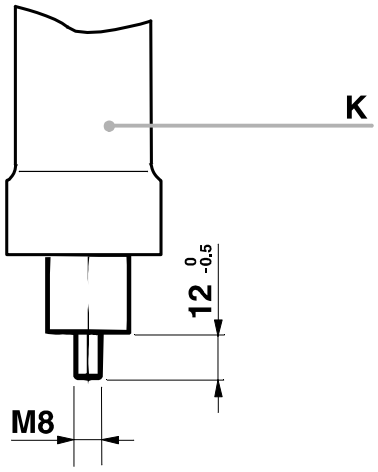
12.2.1 Amplitudes with amplified converter

2

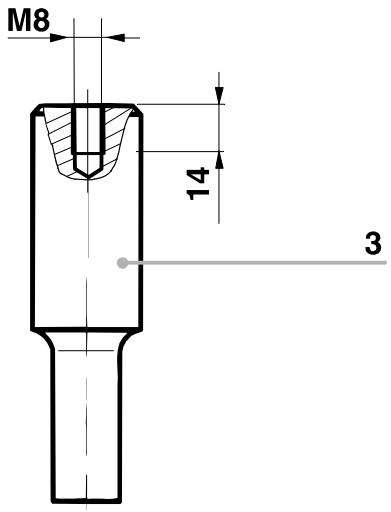


12.3 Stud length of the vibration components; 35 kHz

3 35 kHz



3a

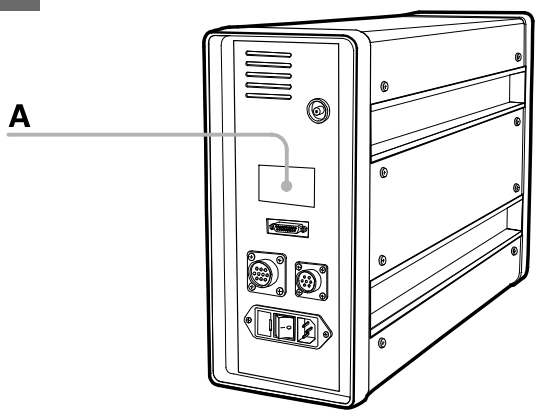


K *Converter*

The converter stud is an integral component of the converter and *cannot* be detached!

3 *Horn*

1



13 Service center addresses

In the event of technical malfunctions or welding problems, the RINCO ULTRASONICS AG Aftersales Technical Service Center will be glad to help.

To provide useful advice, our Aftersales Service Center needs the following information:

1. The type designation and serial number of the device.
2. An exact description of the technical malfunction or welding problem.

Our address:

..... RINCO ULTRASONICS AG
Industriestrasse 4
CH-8590 Romanshorn
Switzerland

Switzerland
..... 071 466 41 00
..... 071 466 41 01

International
..... ++41 71 466 41 00
..... ++41 71 466 41 01